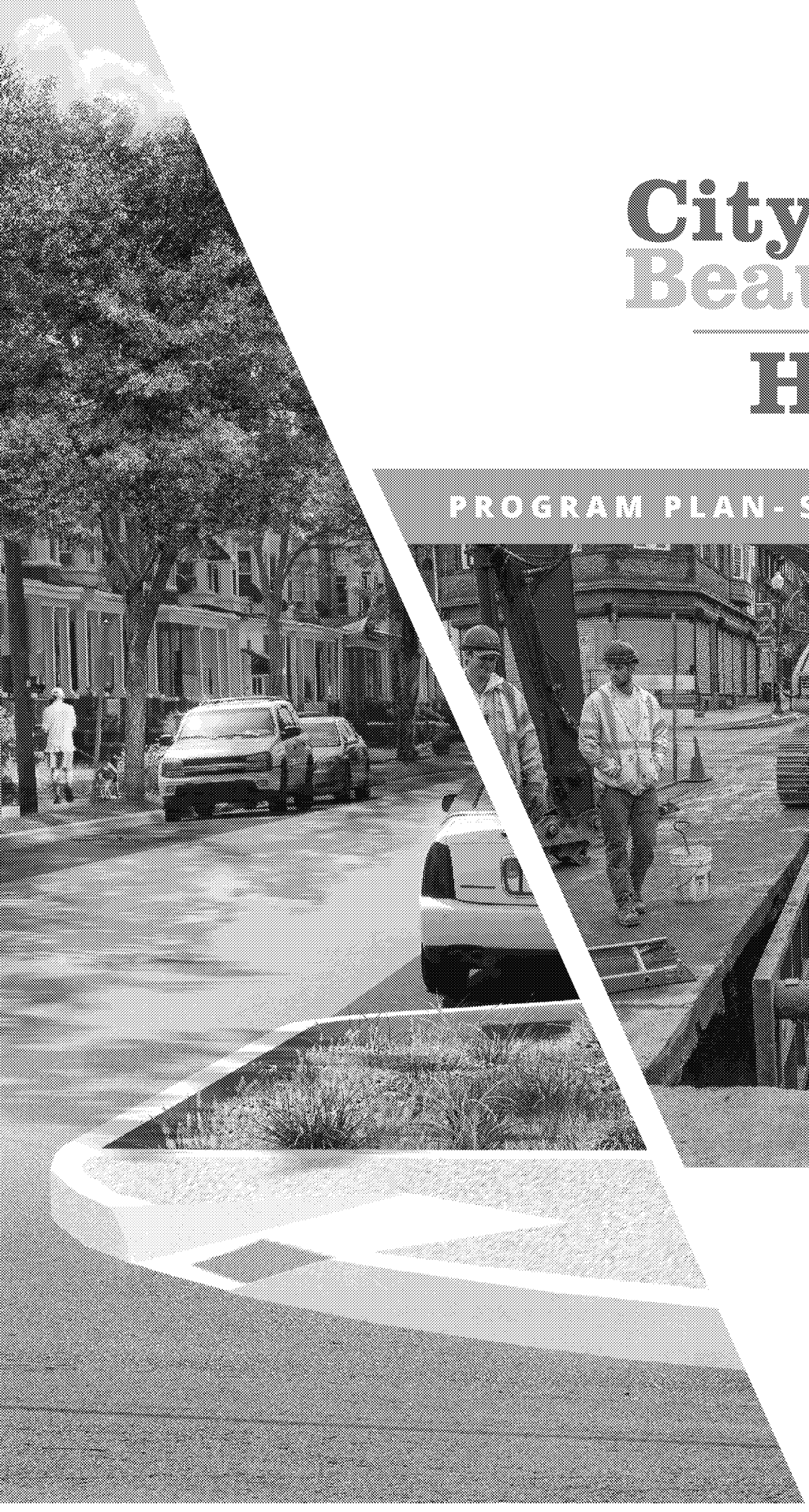
City Beautiful H_2O

PROGRAM PLAN- SUPPLEMENT 1



CAPITAL REGION™ WATER

Capital Region Water
City Beautiful H_2O Program Plan
Supplement 1
filed August 31, 2018

Introduction:

Capital Region Water's Integrated Municipal Wastewater Plan (City Beautiful H_20 Program Plan) was submitted to US EPA and PADEP on March 29, 2018. CRW received review comments from EPA date-stamped July 6, 2018.

Representatives of Capital Region Water ("CRW") met with representatives of EPA and PADEP in Harrisburg on August 7, 2018. That meeting fulfilled the obligation of CRW to respond to EPA's July 6th Comment Letter within 45-days.

This Supplement is being filed to clarify the approach of CRW which is proposed to overcome the findings of certain deficiencies found by EPA.

The major topics discussed below fall into the following categories:

1. **5-year periodic review under Adaptive Management Approach**. Under its adaptive management approach, CRW was proposing a review of the program status at the 10 and 15-year program milestones. CRW is now proposing a review every 5 years. The first 5-year period will be 2018 to 2022.

2. **Program Plan Implementation and Capture in Years 1 through 10:** In years 1 to 10 of the plan, CRW estimated an ability to increase capture from 53% to 79%. The funding and implementation of most of the improvements to accomplish that improvement is actually planned for the first 5 years, so there may be an ability to approach the 80% capture level much sooner.

3. **Program Plan Implementation and Capture in Years 10 through 20**: In comment 32b, EPA noted that during the near-term implementation period (years 10 to 20) of the Program Plan, CRW estimated an ability to increase CSO capture by only 1%. While the modest increase in capture is the projected outcome of the tightly budgeted plan, CRW fully expects better performance. The incorporation of a 5-year evaluation will enable program analysis and adjustment to improve on that level of capture.

4. **Updated FCA**: In its letter of September 9, 2016, EPA urges for a more robust Financial Capabilities Assessment. CRW will provide an update of the FCA in year 4. This should allow time to sort out the confusion that surrounds the Intermunicipal Agreements that establish rates to be paid by the suburban communities.

5. **Reduction of Flow from Suburban Systems**. CRW believes it can create incentives for the suburban communities to control I&I into their sanitary systems. In addition, CRW understands that DEP can

require improvements. Certain areas, like the Spring Creek Interceptor, may require special regulatory measures to solve that problem.

6. **Focus on CSO reduction and Asset Management**. CRW wants to clarify that it is focused under the Partial Consent Decree on minimizing CSO and that much of the system rehab is baseline work for that improvement.

7. **Stormwater Management**. CRW has not explicitly factored into its planning the direct impact of development or redevelopment governed under more restrictive Stormwater management regulations. CRW does plan to implement a stormwater fee that will incentivize management of stormwater by private landowners in the next year or two. CRW also intends to implement regulations that will require more substantial management of runoff from impervious land uses. Outreach and public education about the impacts and cost of stormwater management under this program is expected to have a beneficial effect, not yet quantified on the excess flows that currently exacerbate CSOs.

8. **Sanitary and Storm Separation Projects**: EPA commented that CRW should be more active in evaluation of possible separation projects. The existing CRW Program Plan has identified potential collection system separation, sanitary sewer rerouting, stormwater pipe disconnection, and CSO regulator consolidation/connector pipe expansion projects within many of the designated study areas. Additionally, CRW is evaluating the impact of accelerating one large project in the Bellevue Park area (CSO-048), that could serve as a demonstration project on the benefits of removing excess stormwater from the combined system. To be cost effective, this project will require a waiver of regulations that could require treatment of stormwater. CRW would also explore grant funding for this project.

9. **Off-site Storage**: EPA commented that CRW should evaluate off-line storage. CRW can expand evaluation of some of the off-line opportunities identified in the Program Plan, but is not expected to promote a tunnel. CRW would like to discuss further in detail during the next technical review meeting and will then report on the progress of this effort during the first 5-year Adaptive Management Plan (AMP) evaluation.

10. **Improved treatment process at AWTF**: EPA commented on the evaluated alternate improvements to the treatment process at the Advanced Wastewater Treatment Facility. Fieldwork is underway to address the hydraulic restriction in the secondary clarifier launders. CRW will proceed with evaluation of secondary plant capacity once that work is completed later this autumn.

11. **Technology, Sensors and Real-time Control**: CRW agreed to further investigate how real time controls can improve the operation of the system. CRW intends to follow-through with installation of level and velocity monitoring sensors after completion of several of the early projects that will increase the capacity of the conveyance system. Once the interceptors and Front Street Pump Station are improved, we can benchmark the conveyance system in its modified configuration, then proceed with optimization of pumping equipment operation and potentially implementation of automated gates/weirs to minimize CSO activity.

1. **5-year periodic review under Adaptive Management Approach.** Under its adaptive management approach, CRW proposed a review of the program status at years 10 and 15. CRW is now proposing a review every 5 years to include the initial period of implementation. The first 5-year period will be 2018 to 2022.

This approach is consistent with Comment 7 from EPA, which recommended that the Adaptive Management Plan be submitted every five years.

A 5-year review is also consistent with EPA comment 28, where CRW was urged to add "an evaluate and adapt point at year five."

The planning, design, financing and in many cases construction of the first period projects are underway. The following four tables provide an accounting of the projects with their objectives, wet weather benefits, costs and schedules.

Table 1-1, CRW AWTF Capital Improvements (major) *

Project Name	Project Objectives	Estimated Construction Cost	Projected Project Completion	Wet Weather Control Benefits
Headworks Screening	▪ Install mechanically cleaned fine screening	$3.6M	Q4 2018	Increases hydraulic capacity to 80 MGD, with additional 40 MGD backup capacity.
Primary Digester Rehabilitation	▪ Replace digester covers and mixing systems, associated piping and valves ▪ Replace electrical controls and switchgear ▪ Clean and insulate digester tanks	$8.2M	Q1 2020	Restore and maximize biosolids digestion capacity Improve overall AWTF operational efficiency Maximize digester gas production potential
Primary Clarifier Improvements/ Repair	▪ Replace clarifier sludge collection drives, chains, flights, pumps, and associated piping and valves ▪ Install additional baffles to reduce short circuiting and re-suspension of settled solids. ▪ Repair/rehabilitate concrete structure	$6M	Q4 2020	Increase hydraulic capacity to 80 MGD Improved wet weather operations allows more efficient use of chemically-enhanced settling. Improves settling/reduces re-suspension in clarifiers at 80 MGD hydraulic capacity.
Combined Heat & Power System Rehabilitation	▪ Replace combined heat and power system, which is beyond its useful life	$10M	Q4 2020	Restore operational efficiency to digester gas cogeneration and heating system.
Additional Solids Process Rehab/ Improvements	▪ Equalization/ pretreatment for high strength waste ▪ Secondary Digesters – clean, rehab, cover replacement	$5M	Q4 2022	Restore operational efficiency to solids processes

** Numerous minor capital improvements are also made annually to maintain operational efficiency. Examples include pump replacement, repair to critical plant components (i.e., cogeneration and cryogenic oxygen generation systems)*

Table 1-2, CRW Conveyance System Capital Improvements

Project Name	Project Objectives	Estimated Construction Cost	Projected Project Completion	Wet Weather Control Benefits
Paxton Creek Interceptor Rehabilitation	▪ Restore structural integrity of 13,500 ft. pipe.	$20M	3Q 2020	Strengthened pipe allows operation under surcharge, enabling realization of full hydraulic capacity.
Asylum Run Interceptor Rehabilitation	▪ Restore structural integrity of 2,500 ft. pipe.	$1.2M	4Q 2018	Strengthened pipe allows operation under surcharge, enabling realization of full hydraulic capacity.
Front St. Interceptor Rehabilitation, Ph. 1	▪ Restore structural integrity of 2,000 ft. pipe.	$0.6M	4Q 2018	Strengthened pipe allows operation under surcharge, enabling realization of full hydraulic capacity.
Front St. Pump Station	▪ Complete Pump Station Rehabilitation ▪ Replace pumps, screens and all associated operating equipment	$12M	2Q 2020	New pumps increase hydraulic capacity from 40 to 60 MGD,
Front St. Interceptor Rehabilitation, Ph. 2	▪ Restore structural integrity of 10,600 ft. pipe	$9M	4Q 2020	Strengthened pipe allows operation under surcharge, enabling realization of full hydraulic capacity.
Spring Creek Interceptor Rehabilitation	▪ Restore structural integrity of 5,100 ft. pipe. ▪	Joint project with Suburbs - tbd	4Q 2022	Strengthened pipe allows operation under surcharge, enabling realization of full hydraulic capacity.
Spring Creek Pump Station	▪ Replace Spring Creek P.S. most likely on a new site, co-located with a storage facility	$7.5M	4Q 2022	New pumps increase hydraulic capacity from 18 to 30 MGD.
CSO Regulator Enhancements	▪ Modify exist control orifices to maximize wet weather capture ▪ Restore flap gates and outfall pipes to prevent river intrusion	$2.5M	4Q 2021	Increases conveyance to interceptor, prevents backflow from interceptor in surcharge conditions, and reduces river intrusion, increasing typical year CSO capture from 53% to 78%.

Table 1-3, CRW Collection System Green Stormwater Infrastructure Projects

Project Name	Project Objectives	Estimated Construction Cost	Projected Project Completion	Wet Weather Control Benefits
Third St. Multi-Modal GSI	▪ Early action GSI demonstration project within ROW. ▪ Multiple rain gardens and tree trenches.	$2.8M	Q3 2019	*Wet Weather Control Benefit quantification is not finalized.*
Parks GSI – Cloverly Heights	▪ Demonstration porous asphalt basketball court with subsurface storage (lined – Karst) ▪ Rain garden demonstration with small pretreatment rain garden	$0.4M	Q3 2018	Reduce peak flows of runoff from park and surrounding neighborhood in a separate-sewered area of the City
Parks GSI – Royal Terrace	▪ Early action GSI demonstration project within City Park ▪ Demonstration porous asphalt basketball court with subsurface storage and infiltration system	$0.3M	Q3 2018	Managing runoff from 34,500 square feet drainage area. System was designed to provide 0.88 ac-in of storage below the overflow.
Parks GSI – Penn & Sayford	▪ Early action GSI demonstration project within City Park ▪ Two rain gardens	$0.1M	Q3 2018	Managing runoff from approximately 14,600 square feet drainage area. Total storage volume > 0.16 ac-in.
Parks GSI – 4th & Dauphin	▪ Early action GSI demonstration project within City Park	$0.4M	Q4 2019	*Wet Weather Control Benefits are not finalized.*
Summit Terrace Neighborhood GSI	▪ Early action GSI demonstration project remediating and repurposing vacant lots to manage stormwater and provide neighborhood amenities.	$0.4M	Q3 2018	Manage 1.15 acres of existing impervious area resulting in approximately 950,000 gallons of stormwater capture per year.
Camp Curtain Big Green Block GSI	▪ Early action GSI demonstration project in partnership with community and church.	$2.1M	Q4 2019	*Wet Weather Control Benefits are not finalized.*
MulDer Square GSI	▪ Early action GSI demonstration project within ROW	$1M	Q4 2019	*Wet Weather Control Benefits are not finalized.*
South Allison Hill GSI	▪ Early action GSI demonstration project within ROW	$1.2M	Q4 2019	*Wet Weather Control Benefits are not finalized.*
2nd St. / 7th St. Multi-Modal GSI	▪ Early action GSI demonstration project within ROW	$1M	Q4 2019	*Wet Weather Control Benefits are not finalized.*
Paxton Creek Stream Restoration	▪ Stabilize Paxton Creek streambank, reducing sediment and nutrient loading.	$0.4M/yr	Ongoing (likely beyond 2023)	Regional project with Lower Paxton and Susquehanna Townships achieves full Paxton Creek TMDL and initial Chesapeake Bay TMDL load reductions.
Stormwater Regulations	▪ Implement wet weather fee and credit structure. ▪ Provide enhanced wet-weather performance standards for development projects. ▪ Support enforcement of pollution prevention mechanisms.		Ongoing	Provide a funding stream, incentives, requirements, and performance standards for proper wet weather management on property discharging to CRW's system.

Table 1-4, CRW Collection System Rehabilitation, Separation, Storage Projects

Project Name	Project Objectives	Estimated Construction Cost	Projected Project Completion	Wet Weather Control Benefits
Priority System Cleaning and Televising Program	▪ Contracted service focusing on priority sections of CRW's system that are either impractical or inefficient to self-perform ▪ Expedite completion of cleaning and assessment of entire system	$250,000 $250,000 $250,000 $250,000 $250,000	Q4 2018 Q4 2019 Q4 2020 Q4 2021 Q4 2022	▪ System assessment and prioritization ▪ Identification of pipe (CSS, SS and MS4) for rehabilitation and replacement to prevent failures leading to DWOs and SSOs
Market Street Rehabilitation and Wet Weather Control	▪ Repair/replace collapsed sewer in Market St. (parallel 36-in brick lines) ▪ Rebuild/restore inlets ▪ Install decentralized green/grey stormwater controls	$1.3M $0.5M $1M	Q4 2018 Q4 2019 Q4 2019	▪ Reduce DWOs at CSO-037 and basement backups along Market St. ▪ Control CSOs, basement backups, and flooding through use of GSI/restored inlets to manage stormwater at the source and reduce volumes/peaks entering CRWs system.
System-wide Pipe Rehabilitation and replacement	▪ Repair and replacement of failing pipe, manhole, inlet and associated infrastructure	$1.4M $2.5M $2.5M $2.5M $2.5M	Q4 2018 Q4 2019 Q4 2020 Q4 2021 Q4 2022	▪ Reduce DWO activity ▪ Prevent sinkhole formation ▪ Control CSOs, basement backups, and flooding through use of GSI/restored inlets to manage stormwater at the source and reduce volumes/peaks entering CRWs system.
CSO-048 (Mish Run, Bellevue Park) Separation and Wet Weather Control	▪ Install decentralized green/grey stormwater controls. ▪ New separate trunk storm sewer to connect existing separate storm sewers to Paxton Creek.	$18M**	Q4 2022	▪ Redirect 118 acres of separate storm sewers out of CSO 048 combined sewers, reducing 90 MG of CSO volume during typical year. ▪ Control peak flows/volumes to minimize trunk storm sewer size. ▪ Reduce stormwater pollution/ volumes.

** *Cost of separation only. Does not include cost to attenuate and treat ($60-$100M additional)*

During the first 5-year period, CRW currently projects investment of about $110 million dollars of capital improvements.

Though the original Program Plan submission differentiated between projects focused on CSO control and infrastructure rehabilitation projects, the distinction is unimportant. All of this work should be recognized with the goal of reducing the Combined Sewer Overflows. There should be recognition that

due to the condition of the systems, many projects must be completed to first stabilize, strengthen and upsize the current system (e.g., Interceptor Rehabilitation projects) before steps can be taken to maximize utilization of interceptor volume.

The focus of the first phase of implementation work is to recover the full capacity of CRW's interceptor system through rehabilitation and regulator modification projects and maximize the capacity of pumping stations to deliver as much flow to the AWTF as practical. The work is being complemented with green stormwater infrastructure demonstration projects and critical collection system repairs with the goal of reducing DWOs and SSOs while raising local awareness of stormwater management BMPs for widespread implementation. The projected performance of these improvements should increase CSO capture from 53% to 79% system-wide.

2. **Program Plan Implementation and Capture in Years 1 through 10: During the immediate** (years 1 through 10) implementation period, the CRW Program Plan estimated an ability to increase CSO capture from the current 53% to approximately 79%. Much of the engineering design and funding, and most of the required improvements to the AWTF, pump stations, interceptor system, and regulator structures are scheduled for implementation during the first five years. These significant improvements will bring the CRW system to a safe and reliable state and will facilitate a significant improvement to the CSO capture level provided by the CRW system.

It is understood that the ultimate goal of all CSO LTCPs is to achieve water quality compliance, and the CRW Program Plan will provide a specific long-term path to meeting water quality standards. Over time, the revised FCA will determine the associated implementation schedule to construct the specified facilities and projects within CRW's financial constraints. Per current analysis:

- CRW is able to commit approximately $110 million to specific CSO control projects and schedules through the first 5 years of Program Plan implementation, focused on the rehabilitation and optimization of CRW's conveyance system and AWTF. That work is detailed in Tables 1-1 through 1-4.
- CCTV investigations, high priority collection system repairs, pilot decentralized green-grey stormwater controls, and a revised institutional framework will also be instituted during these initial 5 years.

For years 5 through 10, continuing wet weather control projects are of necessity less tightly defined and subject to adaptive management as needed information continues to be obtained. The findings of collection system CCTV inspections, implemented stormwater management and development ordinances, and analysis results from completed pilot projects of decentralized green/grey control measures are required to develop projects and schedules for subsequent years. Specific projects and associated schedules will be developed under an adaptive management approach. The CRW Program Plan currently calls for a total investment of approximately $84 million (in 2017 dollars) from years 6 through 10 as follows:

- Approximately $25 million would be dedicated to ongoing high-priority collection system projects that are identified through the ongoing CCTV investigation and analysis program. Specific projects and schedules would be developed on an adaptive management basis from the

new information collected. While this work will respond to infrastructure condition needs, it will also be coordinated with CSO/water quality needs as well, such as increased infrastructure sizing to provide additional storage or incorporation of GSI during the restoration of roadways impacted by construction efforts.

- Approximately $31 million would be invested in decentralized green/grey projects. Potential project opportunity areas have been identified within the various planning areas. Specific projects and schedules will be developed through the adaptive management process as specific opportunities are identified. These opportunities would include pairing specific green/grey measures to identified high-priority collection system projects and identified development/redevelopment projects.

- The balance is committed to AWTF rehabilitation work.

EPA comment 12 asks how CSO capture was calculated for the Program Plan, which CRW has identified at 53%. The total system-wide volume, including base flow, was calculated for all of the identified wet weather periods. CSO capture was calculated as the total typical year flow during wet weather periods, minus the total annual CSO discharge volume, divided by the total typical year flow during wet weather periods. Details on the calculation would be discussed during the future technical meeting proposed by EPA at the August 7 meeting with EPA/DEP.

3. **Program Plan Implementation and Capture in Years 10 through 20**: For years 10 to 20, CRW estimated an ability to increase capture by 1%. CRW now expects the ability to improve on that level of capture.

The CRW Program Plan currently calls for a total investment of approximately $57 million (in 2017 dollars) during program years 11-20. Approximately $26 million would be dedicated to ongoing high-priority collection system projects that are identified through the ongoing CCTV investigation and analysis program. Specific projects and schedules would be developed on an adaptive management basis from the new information collected. Approximately $31 million would be invested in additional decentralized green/grey projects. Specific projects and schedules will be developed through the adaptive management process as specific opportunities are identified.

As noted in Section 7, the implementation of a formal stormwater management plan will likely create additional beneficial effects.

4. **Updated FCA**: In its letter of September 9, 2016, EPA urges for a more robust Financial Capabilities Assessment. CRW will provide an update of the FCA in year 4. This should allow time to sort out the confusion that surrounds the Intermunicipal Agreement which establishes rates to be paid by the suburban communities.

As discussed during our August 7th meeting, CRW understands EPA's position in looking upon CRW's conveyance and treatment facilities regionally, as the systems serve the larger region than just the City of Harrisburg. CRW asks that EPA also acknowledge that there is significant economic disparity between the ratepayers in the City and the suburban ratepayers, and CRW is limited by 1976 intermunicipal

agreements that establish the terms of our wholesale service to the six suburban municipalities that utilize our facilities.

CRW proposes preparation of a revised FCA during the first phase of improvements in year four. This should provide adequate time to obtain clarity under the IMA regarding the financial obligations of the parties.

5. **Reduction of Flow from Suburban Systems**. CRW believes it can create incentives for the suburban communities to control I&I into their sanitary systems. In addition, CRW understands that DEP can require improvements. Certain areas, like the Spring Creek Interceptor basin, which experiences frequent SSO activity during wet weather may require special regulatory intervention to remedy.

The Spring Creek Interceptor is discussed in EPA Comment 4 and 26f, which noted that CRW was providing no indication that it was actively pursuing a regional solution to these wet weather flows. On the contrary, CRW provided the five suburban wholesale customers that send flows through Spring Creek with a September 13, 2017 technical memo detailing our hydraulic evaluation of the interceptor. We subsequently convened a meeting on January 26, 2018 to discuss the hydraulic capacity limitations of the line. The meeting was attended by representatives of Susquehanna, Lower Paxton and Swatara Townships. There has not been any activity on the situation since that meeting.

While the final portion of the interceptor lies within the City of Harrisburg, the majority of the contributory drainage basin (10.5 of 11.4 acres) lie outside the City, and the interceptor primarily serves the five suburban municipalities (Penbrook and Paxtang Boroughs, Susquehanna, Lower Paxton and Swatara Townships). Therefore, CRW believes that the leadership on this project should lie with the suburban municipalities.

6. **Focus on CSO reduction and Asset Management**. CRW wishes to clarify that our focus under the Partial Consent Decree is very clearly on minimizing Combined Sewer Overflow activity. It is an unfortunate reality that the Harrisburg sewer system has suffered decades of deferred maintenance, and that much of the system rehab is baseline work that is foundational for CSO control improvement. CRW is fully mindful of the full scope of improvements necessary when rehabilitating infrastructure, not simply to return each asset to service but to also expand their capacity or functionality as well.

In comment 9, EPA asked how the upgrades to pump stations will contribute to CSO reductions. The improvements to the Front Street Pump Station will not only rehabilitate facilities well beyond their intended life (1959) but will increase the conveyance capacity of the station by over 50% and improve screening as well. Those improvements coupled with the interceptor rehabilitation projects and regulator weir adjustments (all of which follow comprehensive system cleaning for the first time in at least 50 years) will minimize upstream overflow activity during routine rain events.

EPA expressed concern in comment 10, that CRW is prioritizing asset management issues over CSO control and SSO elimination needs. In fact, the two priorities are not mutually exclusive. CRW must address the resiliency of the system to support the hydraulic demands of additional system storage. There is also a direct connection between failing brick sewers and collapsing clay pipes and DWO and SSO activity. These system failures contribute directly to sewer back-ups and releases into basements,

etc., and the debris from pipe failures obstruct gates when scoured into regulator structures leading to subsequent dry weather overflow activity.

We received a great deal of feedback from ratepayers during our community greening plan outreach efforts. We heard time and time again that we should be focused on repairing the "broken pipes and inlets" rather than developing stormwater BMPs. Our response was then and continues to be – the two needs are complementary and equally important.

The above explanation should help resolve the issue expressed by EPA in comment 19 where it is noted that CRW has suggested that much of the rehabilitation expenditures will serve the purposes of both sewer rehabilitation and CSO control technology.

7. **Stormwater Management**. CRW has not explicitly factored into its planning the direct impact of development or redevelopment governed under more restrictive Stormwater management regulations. CRW does plan to implement a stormwater fee that will incentivize management of stormwater by private landowners in the next year or two. CRW also intends to implement regulations that will require more substantial management of runoff from impervious land uses. Outreach and public education about the impacts and cost of stormwater management under this program is expected to have a beneficial effect, not yet quantified on the excess flows that current exacerbate CSOs.

The first 5 to 6 years of CRW's Program Plan focuses on the rehabilitation and optimization of CRW's conveyance and treatment systems, significantly increasing CSO capture. The recommended strategy for further wet weather control, a decentralized green-grey stormwater control strategy, will greatly address all major CRW integrated stormwater and wastewater management objectives:

- Reduce CSO volumes/frequencies/pollutant loads.
- Prevent basement backups and flooding within the collection system.
- Reduce pollutant discharges from CRW's separate storm sewer system.
- Rehabilitate CRW's sewer system to avoid catastrophic system failures.

CRW is revising its stormwater management regulations and building relationships with a wide variety of stakeholders to provide the institutional framework necessary to advance its decentralized green-grey stormwater strategy.

It is important to note that CRW has only taken credit for CSO reductions and/or water quality improvements achieved through investment of ratepayer funds in decentralized green-grey stormwater infrastructure. As regulatory and institutional frameworks are established over the first five years of implementation, CRW expects to achieve additional CSO control/water quality improvement through decentralized green-grey stormwater controls implemented by developers and/or other stakeholders. An estimate of this additional control level is expected to emerge as the regulatory/institutional framework solidifies.

8. **Sanitary and Storm Separation Projects**: EPA commented that CRW should be more active in the evaluation of possible separation projects. The existing CRW Program Plan has identified potential collection system separation, sanitary sewer rerouting, stormwater pipe disconnection, and CSO regulator consolidation/connector pipe expansion projects within many of the designated study areas. These small-scale projects are primarily located in proximity to Paxton Creek and the Susquehanna River. If all were to be implemented, the total sewer shed area of separation would be 118 acres with a total estimated cost of $70 million. These projects are considered part of CRW's decentralized green-grey stormwater control strategy, but require findings of CCTV investigations before specific recommendations can be made. For example, CCTV inspections performed to date have identified critical sewer repairs in the drainage area of CSOs.

One additional large-scale project was identified that would separate stormwater from catchment areas in the sewer shed that impacts CSO-048 (Reservoir Park/Bellevue Park area) and was discussed at the August 7, 2018 meeting. This project could serve as a large-scale demonstration project on the benefits of removing excess stormwater from a larger portion of the overall system. However, as was also discussed at the meeting, this project would require a waiver of regulations on the antidegradation aspects of the Paxton Creek TMDL that could require treatment of the raw separated stormwater. It is expected this project would be appropriate for grant funding.

9. **Off-site Storage**: EPA commented that CRW should evaluate off-line storage. CRW can expand evaluation of some of the off-line opportunities identified in the Program Plan, but is not expected to promote a tunnel. CRW would like to discuss further in detail during the next technical review meeting and will then report on the progress of this effort during the first 5-year AMP evaluation.

In Comment 20, EPA states that CRW did not consider offline storage like box culverts. However, the Program Plan has identified and assessed opportunities for off-line storage within many of the planning areas. In Comment 5, EPA instructed CRW to reevaluate potential use of deep tunnel controls with smaller pipe diameters and smaller tunnel volumes. CRW suggests that this detailed technical topic be discussed at a separate technical meeting as was suggested by EPA at the August 7 meeting.

10. **Improved treatment process at AWTF**: EPA commented on the evaluated alternate improvements to the treatment process at the Advanced Wastewater Treatment Facility. Field work is underway to address the hydraulic restriction in the secondary clarifier launders. CRW will proceed with evaluation of secondary plant capacity once that work is completed later this autumn.

In comment 24, EPA is asking for additional details on the third control point for Systemwide Control Strategy 1. In comment 27, EPA is seeking an analysis of efforts to improve the operations of the AWTF, such as a higher level of treatment of bypass water, chemical enhancement, sedimentation and filtration and expanded secondary treatment. The existing Program Plan provides control alternative analyses for a full range of peak hydraulic and treatment capacities at the AWTF, and for a wide range of treatment technologies, up to and including a zero overflows per year level of control. To ensure that the requested additional information is properly understood, the topic should be discussed at the future technical meeting as proposed by EPA during the August 7 meeting.

11. **Technology, Sensors and Real-time Control:** CRW agreed to further investigate how real time controls can improve the operation of the system. CRW intends to follow-through with installation of level and velocity monitoring sensors after completion of several of the early projects that will increase the capacity of the conveyance system. Once the interceptors and Front Street Pump Station are improved, we can benchmark the conveyance system in its modified configuration, then proceed with optimization of pumping equipment operation and potentially implementation of automated gates/weirs to minimize CSO activity.

The greatest opportunity for effective real-time control would be to enhance the communication between the Front Street and Spring Creek Pump Stations and the AWTF. A real time control (RTC) system between these three facilities would ensure that wet weather flow conveyed for treatment would be maximized over a wide range of storm sizes, intensities and durations. Analyses supporting this kind of system would need to occur after the completion of the interceptor, pump station and AWTF enhancements and after the new facilities have settled in. Additional RTCs would provide significant benefit only in conjunction with a storage alternative under an adaptive management perspective.

As documented in the Program Plan, CRW has already implemented a network of area/velocity flow meters at key locations along the interceptor system and at the key points of connection between the suburban wastewater collection systems and the CRW system.

CRW appreciates this opportunity to clarify and supplement its initial submittal. We look forward to further discussions at the next technical review committee and are prepared to provide the EPA and PADEP with appropriate updates on our progress.

Respectfully submitted,

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